AD_____

Award Number: W81XWH-05-1-0266

TITLE: Cord Blood Stem Cell Procurement in Minority Donors

PRINCIPAL INVESTIGATOR: Voravit Ratanatharathorn, M.D.

CONTRACTING ORGANIZATION: Wayne State University
Detroit, MI 48202

REPORT DATE: March 2006

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;
Distribution Unlimited

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
01-03-2006	Annual	1 Feb 2005 - 31 Jan 2006

4. TITLE AND SUBTITLE
Cord Blood Stem Cell Procurement in Minority Donors

5a. CONTRACT NUMBER

5b. GRANT NUMBER
W81XWH-05-1-0266

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Voravit Ratanatharathorn, M.D.

E-Mail: ratanath@karmanos.org

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Wayne State University
Detroit, MI 48202

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT:

This progress report summarizes the clinical activity of cord blood procurement and the preliminary analysis of the yield of the cord blood cells for the purpose of clinical transplantation. The purpose of collection and procurement of cord blood is for public use and will be accessible to all the stem cell transplantation centers worldwide. Cord blood is a readily available source of hematopoietic stem cells that is more accessible than other lived donors, since the cryopreserved cord blood units (CBU) have already been extensively characterized in term of tissue typing and screening for infectious disease markers. The CBU from minority donor, especially African/American, is particularly valuable because of difficulty with finding a matched donor and CBU allows less stringent matching. Thus, CBU is a rapid solution to patients who are in urgent need of stem cell transplantation and no living donor available. Our preliminary analysis of the collected CBUs shows significantly lower content of nucleated cells in CBUs from African/American mothers. We have not identified adverse maternal health variables associated with lower cell dose. Improvement of availability of CBUs will have to come from increase recruitment of donors.

15. SUBJECT TERMS
cord blood, transplantation, minority, African/American, stem cell, donor

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			USAMRMC
U	U	U	UU	6	**19b. TELEPHONE NUMBER** *(include area code)*

Table of Contents

INTRODUCTION

The purpose of this research is to increase the efficiency of procurement of minority cord blood units for the clinical stem cell transplantation. In the first year of this project, we will focus our effort on the investigation of the total nucleated cell yield of the cord blood units (CBUs) from African/American donors in comparison with other racial groups and to investigate the maternal health variables that might influence the total nucleated cell yield.

BODY

The ultimate purpose of this project is to be able to bank most of the African/American cord blood units from mothers delivering their babies in the Metropolitan Detroit areas. Therefore the strategy to capture the cord blood units from all the collaborating hospitals in the area is crucial to our success. To accomplish this, we have identified several hospitals to become collection sites for our cord blood bank. Our first target hospital is St. John Hospital in Detroit. Development of multiple cord blood collection sites is a complex organizational effort since cord blood collection in the US is still performed under IND. In our case we use the protocol developed by the National Marrow Donor Program (NMDP), Minneapolis, MN 55413, for all the collection sites. Each collection site submits the NMDP protocol to their IRB. The cord blood units collected at each site are shipped to the stem cell processing laboratory at the Karmanos Cancer Institute. The regulatory requirements for cord blood collection under IND are extremely labor-intensive and cause significant delay in getting the collection process into full speed. Collection at St. John Hospital began on 2/8/06 following approval from WSU IRB and the standard operating procedure for cord blood collection is being fine tuned and will be adopted for additional collection sites. The technique for collection of cord blood unit at St. John is 'in utero', and this technique may reduce the cell loss and contamination of the CBUs.

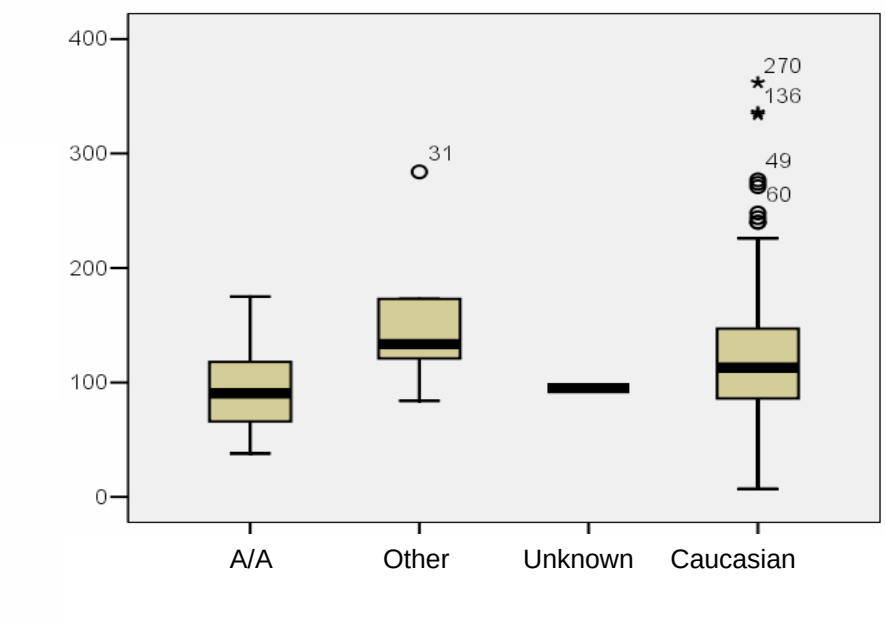
The data collection according to the protocol submitted to DoD entitled 'Investigation of the Total Nucleated Cell Yield of Cord Blood Units Collected from African-American Donors in Correlation with Gestational and other Health Variables' was reviewed and approved on 9/7/2005. The purpose of this protocol is to investigate the total nucleated cell yield of the cord blood units from African/American donors and its correlation with gestational history, maternal history and delivery information. (See attached protocol)

From 9/7/05 to 1/31/06 we collected 340 CBUs at St. John Hospital. There were 137 ineligible CBUs, mostly due to low volume. The remaining 203 units were included in the analysis. There were 38 African/American units and 158 Caucasian CBUs; the remaining 6 CBUs were other racial group and one unknown. Total nucleated cell dose for each racial group were list below.

Race	Descriptive		Statistic	Std. Error
African/American	Mean		94.42	5.952
	95% Confidence Interval for Mean	Lower Bound	82.36	
		Upper Bound	106.48	
	5% Trimmed Mean		93.37	
	Median		90.50	
	Variance		1346.196	
	Std. Deviation		36.691	
	Minimum		38	
	Maximum		175	
	Range		137	
	Interquartile Range		54	

	Skewness		.542	.383
	Kurtosis		-.546	.750
Caucasian	Mean		125.28	4.719
	95% Confidence Interval for Mean	Lower Bound	115.96	
		Upper Bound	134.61	
	5% Trimmed Mean		120.50	
	Median		113.00	
	Variance		3518.383	
	Std. Deviation		59.316	
	Minimum		7	
	Maximum		362	
	Range		355	
	Interquartile Range		62	
	Skewness		1.397	.193
	Kurtosis		2.624	.384

Other racial group and unknown not included in this table.



Note: Y axis = Total nucleated cell yield in 1 x 10^7 cells.

Maternal Race	N	Mean	Std. Deviation	Std. Error Mean
African/American	38	94.42	36.691	5.952
Caucasian	158	125.28	59.316	4.719

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper

Equal variances assumed	4.380	.038	-3.066	194	.002	-30.864	10.066	-50.717	-11.010
Equal variances not assumed			-4.063	89.775	.000	-30.864	7.596	-45.954	-15.773

Other maternal variables were explored including gravida and the frequency of prenatal clinic visit did not show any correlation with the nucleated cell yield. The only significant factor associated with total nucleated cell yield is the maternal race. The result of one-way ANOVA is shown below.

One-Way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37169.838	3	12389.946	3.935	.009
Within Groups	626546.280	199	3148.474		
Total	663716.118	202			

KEY RESEARCH ACCOMPLISHMENTS

- Based on this preliminary analysis, the significant findings from this study are as follows:
- CBUs harvested from African/American mothers using *in utero* technique contained lower total nucleated cells than Caucasian mothers.
- There was no correlation of the cell yield with gravida, prenatal clinic visit and health variable.
- This study suggested that improvement of quality of CBUs may have to be compensated by better access to the collection sites and that expansion of the collections site will be most efficient.
- The strategy for donor recruitment will have to be formulated based on the current findings.
- Ongoing collection of the data on the total nucleated cell yield and further analyses of this dataset will be needed to better understand and refine the maternal health variables associated with nucleated cell yield.

REPORTABLE OUTCOMES

See KEY RESEARCH ACCOMPLISHMENT above.

CONCLUSION

In this preliminary analysis revealed the only maternal variable associated with total nucleated cell yield is maternal race. African/American donors had a lower nucleated cell yield and this did not appear to be correlated with the frequency of prenatal clinic visit. Obviously, lower nucleated cell count may be an inherent property of the African/American cord blood donor and there might not be any easy solution to improve the yield by improvement of prenatal clinic visit. Therefore, the practical solution is to increase the participation of African/American donor in the cord blood donation. We are presently designing a cord blood recruitment program targeting minority in the Metropolitan Detroit areas.